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WATER QUALITY CONTROL STUDY OF THE LITTLE
DELL PROJECT, SALT LAKE CITY STREAMS, UTAH:
A STUDY OF THE NEED AND VALUE OF STORAGE
FOR WATER QUALITY CONTROL

Public Health Service
Denver, Colorado

August 1965

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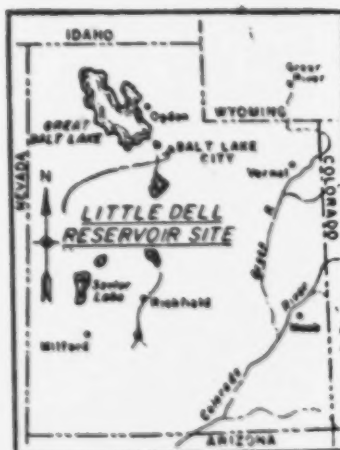
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WATER QUALITY CONTROL STUDY
of the
LITTLE DELL PROJECT
SALT LAKE CITY STREAMS
UTAH

A STUDY OF THE NEED AND VALUE OF STORAGE
FOR WATER QUALITY CONTROL



U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE, REGION VIII
DENVER, COLORADO

August 1965

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Project Salt Lake City streams, Utah. A Study
of the need and value of storage for water quality
control. August 1965. (Public Health Service,
Region VIII)

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WATER QUALITY CONTROL STUDY
of the
LITTLE DELL PROJECT
SALT LAKE CITY STREAMS
UTAH

ABSTRACT

A survey has been made which discloses that there is no need for storage for streamflow regulation for the purpose of water quality control.

Prepared at the request of and in cooperation with the
U. S. Army Corps of Engineers, Sacramento District Office,
Sacramento, California

U. S. Department of Health, Education, and Welfare
Public Health Service
Division of Water Supply and Pollution Control
Region VIII

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I. INTRODUCTION

Request and Authority

The U. S. Army Corps of Engineers, Sacramento District, in a letter dated May 5, 1965, requested the Public Health Service, Department of Health, Education, and Welfare, to comment upon the water quality control aspects of the Corps' proposed Little Dell Project as set forth in the Federal Water Pollution Control Act, as amended (33 U.S.C. 466a (b)).

Purpose and Scope

General objectives of this study are to assess the probable effects of the proposed project on water quality in local streams and reservoirs; to ascertain the benefits or harm resulting from changes in water quality; to assess the suitability of the water for proposed water uses; and to determine the need for and the value of storage for regulation of streamflow for the purpose of water quality control. The study encompasses the eastern portion of Salt Lake County containing the headwaters of Emigration, Parleys, and Mill Creeks. The need for streamflow regulation was studied not only for the present conditions, but also for anticipated future conditions until the year 2065.

A separate report on Vector problems has not been made since the steep gradient of the reservoir basin indicates minimal mosquito production. It, therefore, appears unlikely that specific measures for mosquito control will be required in the construction and operation of the Little Dell Reservoir.

Acknowledgments

The assistance and cooperation of state and federal agencies and individuals are gratefully acknowledged by the Public Health Service. Particular appreciation is expressed to the following for data and advice furnished by their staff members:

Utah State Department of Health
Salt Lake City, Utah

U. S. Army Corps of Engineers
Sacramento, California

Fish & Wildlife Service
Bureau of Sport Fisheries & Wildlife
Salt Lake City, Utah

Salt Lake City Corporation
Department of Water Supply & Waterworks
Salt Lake City, Utah

II. SUMMARY OF FINDINGS AND CONCLUSIONS

Summary of Findings

1. The Corps of Engineers has proposed the Little Dell Project which will be operated jointly with the existing city-owned Mountain Dell Reservoir for flood control and as an additional source of water supply for the Salt Lake City Metropolitan area. This project is located east of Salt Lake City on a tributary to Parleys Creek.
2. The study area includes the drainages of Emigration, Parleys, and Mill Creeks in eastern Salt Lake County, Utah.
3. The proposed project is located in a mountain area that is sparsely populated. Although there are no towns in the project area, it has mountain homes, campgrounds, picnic areas and a municipal golf course.
4. The city of Salt Lake is the major water user. Approximately 11 percent of its municipal supply is obtained from the affected creeks. Wastes from Salt Lake City, however, are discharged to the Great Salt Lake.

Conclusions

1. Future development in this area is expected to be of a recreational nature. Increased use of the area for mountain home sites will be limited by availability of land since much of the area is now controlled by the U. S. Forest Service.
2. Since there are presently no major waste discharges and future development of waste sources is not anticipated, pollution problems are not expected in the study area. Water-oriented recreation in the proposed Little Dell Reservoir must conform with the regulations of Salt Lake City.
3. Since the beneficial use of Parleys Creek for recreational purposes is not expected to be adversely affected as a result of deteriorated water quality downstream from Mountain Dell Reservoir, there appears to be no need for storage in the proposed Little Dell Reservoir for streamflow regulation for the purpose of water quality control.

III. PROJECT DESCRIPTION

The project, if approved and constructed, would serve primarily as an additional source of water supply to the Salt Lake City Metropolitan Area. Flows would be diverted to Little Dell Reservoir

from Emigration Creek, Lamba Canyon, and Mill Creek, and the reservoir would be operated jointly with the existing Mountain Dell Reservoir for flood control and water supply.

Figure 1 at the end of this report gives the locations of the proposed project features. The Little Dell Dam will be located on Mountain Dell Creek one and a half miles upstream from the existing Mountain Dell Reservoir. The proposed reservoir would have a storage capacity of 50,000 acre-feet and a surface area of 450 acres. The minimum pool would be 5,000 acre-feet with a surface area of 120 acres.

IV. AREA DESCRIPTION

The project area or study area is located in the Wasatch Mountains approximately seven miles east of Salt Lake City. The three drainages involved, from the summit of the drainage to the city limits of Salt Lake City, contain mostly recreational activities and mountain home sites. Emigration Canyon served as one of the first pioneer routes into Salt Lake City and Parleys Canyon is presently the route of U. S. Highway 40 from the east into Salt Lake City. Mill Creek has many campgrounds and picnic areas; and a municipal golf course is located near the Mountain Dell Reservoir.

The Wasatch Mountains are composed substantially of Precambrian and Tertiary formations of sedimentary, igneous, and metamorphic rocks. These mountains are the eastern section of a great mass which was moved by faulting and uplift to an altitude several thousand feet higher than the valley floor, which comprises the western section (Salt Lake City). Soil profiles in the mountain portions of the area are shallow and poorly developed. To the west of the foothill line the soils are relatively deep, and generally include gravels and sandy loams beginning near the foothill line, and change to alternate layers of sandy and clayey loams in the bottomlands near the Jordan River. To the northwest of Salt Lake City, near the Great Salt Lake, much of the land is poorly drained and is impregnated with mineral salts.⁽¹⁾

The climate of the area is temperate and semiarid. Mean temperature at the dam site is 24.1° in January and 67.7° in July. Extremes in temperature in Salt Lake City range from -20°F to 105°F. The average precipitation is 16 inches in Salt Lake City and increases to approximately 40 inches in the mountains. There is some precipitation each month of the year, including some cloudburst activity.

(1) Information provided by Corps of Engineers in letter of 30 July 1965.

The average precipitation at the dam site is 22.23 inches based on a 35-year average. Snowmelt accounts for up to 70 percent of the runoff from the mountain area. (1)

V. WATER RESOURCES OF THE STUDY AREA

The project area or study area is the drainage basins of Emigration, Parleys, and Mill Creek, bounded on the west by Salt Lake City and the east at the Summit of the drainage. Much of this area is public domain managed by the Forest Service, but private ownership in the canyons has allowed the building of many mountain homes.

Water Supply

Table I provides a comparison of streamflow for the three watersheds under study at the gaging stations and also the inflow in those reaches below the diversions. These figures are for comparison and an indication of magnitudes of flows and are not intended for other use.

The U. S. Fish & Wildlife Service and the Utah Fish and Game Department have asked the Corps of Engineers to maintain specified minimum flows in Parleys Creek above Mountain Dell Reservoir and in Mill Creek below the diversion. No flows have been requested for Emigration Creek and the regimen of flow on Parleys Creek below the Mountain Dell Dam will be unchanged by the proposed Little Dell Project. Fishing and hunting are major activities in the headwaters of these creeks but fishing diminishes near the city limits due generally to the low streamflow which results from water diversions and the existence of a better habitat in the headwaters.

The following is a breakdown of the present sources of water for Salt Lake City as percentage of total:

Salt Lake City Water Use (from Salt Lake City Water Department- July 1964)

Big Cottonwood Creek	37.5%
Little Cottonwood Creek	16.9%
City Creek	11.7%
Emigration Tunnel (spring)	2.4%
Parleys Creek (Mountain Dell)	8.5%
Artesian Wells	3.2%
Deep Pumped Wells	8.9%
Deer Creek Reservoir	10.9%
	<u>100.0%</u>

(1) Information provided by Corps of Engineers in letter of 30 July 1965.

TABLE I

AVERAGE STREAMFLOWS FOR EMIGRATION, PARLEYS, AND MILL CREEKS
in Cubic Feet per Second *

Description	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Emigration Creek at gaging station (inflow below diversion)	1.6 (.7)	1.7 (.2)	1.5 (.2)	1.4 (.1)	1.7 (.5)	5.3 (3.2)	18.5 (10.3)	19.2 (9.4)	9.6 (4.7)	4.2 (2.7)	2.2 (1.7)	1.5 (1.1)
Parleys Creek at gaging station (inflow below dam)	10.0 (.5)	9.7 (.5)	9.3 (.6)	8.8 (.7)	9.7 (1.0)	16.6 (2.0)	53.3 (6.3)	77.4 (14.3)	40.4 (7.0)	18.1 (3.0)	11.9 (1.3)	10.1 (.7)
Mill Creek at gaging station (inflow below diversion)	8.8 (4.5)	8.1 (4.1)	7.4 (3.8)	6.8 (3.5)	7.0 (4.3)	8.0 (6.1)	14.2 (8.8)	32.3 (18.1)	28.8 (14.7)	15.8 (7.2)	11.8 (5.6)	10.0 (4.6)

*Averaged for the 43 years of record (1921-1963) provided by the Corps of Engineers (not adjusted).
Inflows are those flows which originate between the diversions and the gaging stations.

Water Quality

This area is a sparsely populated mountain environment where all water supply and waste disposal systems are individually installed and maintained. Most, if not all, activity in the study area is of a recreational nature and potential sources of pollution are small and can be easily controlled by local regulation and inspection. Salt Lake City already maintains tight control over home building and waste disposal in the area tributary to its domestic water supply system, i.e., Parleys Creek Canyon.

Table II provides an indication of present water quality as obtained from the Salt Lake City Department of Water Supply and Waterworks. These figures are averaged from samples taken over part of 1963 and all of 1964 (approximately one sample per month). Other data obtained do not vary significantly from these figures.

Of the chemical constituents analyzed, none pose a threat to health as is evidenced by the fact that water from Emigration Tunnel and Mountain Dell Reservoir is used for domestic purposes in Salt Lake City. The concentrations of calcium are high and contribute to the high hardness values which are indicated in Table II. Bicarbonates are also high and would result in scale formation at high temperature. Total dissolved solids values are in excess of 500 milligrams per liter, the concentration not to be exceeded in drinking water according to Public Health Service Drinking Water Standards if a more suitable supply is available. Salt Lake City obtains water from many other sources which are mixed in the total system thus modifying the high values noted. (See preceding breakdown of sources). The major single source of water for Salt Lake City is 54.4% from Big and Little Cottonwood Creeks where total dissolved solids are less than 200 mg/l.

Emigration and Parleys Creeks pass through the central part of Salt Lake City via pipeline to the Jordan River. Mill Creek is exposed and passes south of the city. There are some waste discharges to Mill Creek which could be eliminated with proper policing. Salt Lake County is presently active in attempting to clean up its streams and require treatment of all waste before discharge.

VI. THE ECONOMY

As has been pointed out the study area is sparsely populated and there are no concentrations of people which could be called towns. Much of the area is controlled by the U. S. Forest Service and extensive residential and industrial development of the area in the future is not anticipated. It is expected that recreational use of the drainage basin and reservoir will increase but that the impact of such use on the

TABLE II

Chemical Analysis of Water in Study Area
(mg/l)

Description	Emigration Tunnel(Spring)	Farley Mt. Dam	Mill Creek
Silica	15	11.9	18
Iron (Total)	.006	.07	.004
Manganese	.01	.152	.01
Aluminum	-	-	.02
Calcium	133	76.3	98
Magnesium	26	6.3	32
Sodium	21	17.7	15
Potassium	1.5	1.2	2.4
Bicarbonate	309	236	268
Phosphates	.07	-	.04
Sulfates	212	38.6	170
Chlorides	23	26.2	15
Fluoride	.09	.12	.38
Nitrate	2.9	1.17	12
Dissolved Solids	617	304	495
Hard as CaCO ₃	466	288	379
Alka as CaCO ₃	242	217	211
Free CO ₂	24	9.1	19
Spec. Cond. (ECx10 ⁶)	904	460	749
pH (Units)	7.6	8.0	8.1
Temp. (°F)	53	45	57

Source: Data supplied by Salt Lake City Corporation, Department of Water Supply and Waterworks.

Note: Mg/l except where noted.

quality of the water resources of the area can be controlled by regulation of use and provision of waste collection and treatment facilities.

VII. WATER QUALITY CONTROL

Under provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq), in the survey or planning of any reservoir by a Federal Agency, consideration must be given to inclusion of storage for regulation of streamflow for the purpose of water quality control.

The only waste sources, present or projected in the study area, that might affect water quality are from mountain homes in the canyons and recreational activities. Future development in the area may necessitate water supply and sewerage systems being developed on a district basis. The authority for regulating these districts will be the local health unit and the Utah State Health Department. Mountain Dell and Little Dell reservoirs could not provide regulation of streamflow on Mill Creek, and the flows from Parleys Creek would have little effect on the Jordan River which flows into the Great Salt Lake.

The only beneficial use of water in the study area downstream from the diversions or Mountain Dell Dam will be fishing and the esthetic enjoyment of clean streams. Flows necessary to maintain fishing activity where desired have been determined by the U. S. Fish and Wildlife Service. A deterioration of water quality as a result of the project is not expected but reduction in quantities of streamflow will reduce some recreational enjoyment. Since it is not anticipated that waste discharges will enter these water courses, streamflow regulation for assimilating treated waste discharges is not found necessary at this time.

Any proposed recreational use of the Little Dell Project and its effects on water quality considering the use for municipal and industrial water supply need to be coordinated with officials of the local health department and the Utah State Department of Health.

A comprehensive study for water quality management of the Great Basin will provide new and different approaches to the present water patterns. This report therefore should only be considered as an interim study until such an investigation has been completed.

In view of these findings and since it is not anticipated that beneficial use of Parleys Creek downstream from Mountain Dell Reservoir will be adversely affected by water quality deterioration, there appears to be no need for storage in the proposed Little Dell Reservoir for streamflow regulation for the purpose of water quality control.

